

AMENDMENTS TO THE CLAIMS

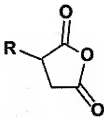
The following listing of claims will replace all prior versions, and listings, of claims in this application.

Listing of Claims:

1. (ORIGINAL) A multi-functional composition for use as an additive for fuels and lubricants comprising an amination product of a hydrocarbyl substituted succinic acylating agent and a mixture comprising an aliphatic polyamine and an aromatic polyamine, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10, and wherein the amination product contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

2. (PREVIOUSLY SUBMITTED). The composition of claim 1, wherein the aliphatic polyamine comprises a substantially linear aliphatic polyamine.

3. (ORIGINAL) The composition of claim 1, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:



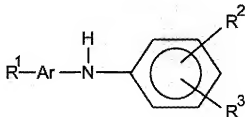
wherein R comprises a hydrocarbyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

4. (ORIGINAL) The composition of claim 3, wherein R comprises polyisobutylene (PIB).

5. (ORIGINAL) The composition of claim 1, wherein a molar ratio of acylating

agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

6. (PREVIOUSLY SUBMITTED) The composition of claim 1, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:



wherein Ar is an aromatic group, R^1 is selected from the group consisting of $-NH_2$, $-NH$ -aryl- NH_2 , $-NH$ -aryl-alkyl- NH_2 , $-NH$ -alkyl- NH_2 , or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R^2 is selected from the group consisting of $-NH_2$, $-NH(CH_2)_nNH_2$, $-CH_2-(CH_2)_n-NH_2$, and $-aryl-NH_2$, in which n and m have a value of from 1 to 10, and R^3 is selected from the group consisting of $-H$, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R^2 and R^3 has a terminal NH_2 group.

7. (ORIGINAL) A lubricant composition comprising an oil of lubricating viscosity and from about 0.1 to 10 wt. %, based on the total weight of the lubricant composition, of the amination product of claim 1.

8. (ORIGINAL) A vehicle having moving parts and containing a lubricant for lubricating the moving parts, the lubricant comprising an oil of lubricating viscosity and from about 0.1 to 10 wt. %, based on the total weight of the lubricant composition, of the amination product of claim 1.

9. (ORIGINAL) A method for making a novel amination product for use as an additive for fuels and lubricants, the amination product having combined dispersant

and antioxidant functionality, the method comprising the steps of:

providing a hydrocarbyl substituted succinic acylating agent to a reaction vessel;

heating the acylating agent to an elevated temperature above room temperature;

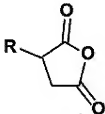
contacting an aromatic polyamine with an aliphatic polyamine to provide a polyamine mixture, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10; and

reacting the amine mixture with the heated acylating agent under an inert atmosphere to provide the novel amination product, wherein the amination product contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

10. (ORIGINAL) The method of claim 9, wherein the polyamine mixture and acylating agent are reacted in the substantial absence of a surfactant.

11. (PREVIOUSLY PRESENTED) The method of claim 9, wherein the aliphatic polyamine comprises a substantially linear aliphatic polyamine.

12. (ORIGINAL) The method of claim 9, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:

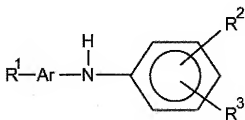


wherein R comprises a hydrocarbyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

13. (ORIGINAL) The method of claim 12, wherein R comprises polyisobutylene (PIB).

14. (ORIGINAL) The method of claim 9, wherein a molar ratio of acylating agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

15. (Previously submitted) The method of claim 9, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:



wherein Ar is an aromatic group, R¹ is selected from the group consisting of —NH₂, —NH-aryl-NH₂, —NH-aryl-alkyl-NH₂, —NH-alkyl-NH₂, or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R² is selected from the group consisting of —NH₂, —NH(CH₂)_nmNH₂, —CH₂-(CH₂)_n-NH₂, and —aryl-NH₂, in which n and m have a value of from 1 to 10, and R³ is selected from the group consisting of —H, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R² and R³ has a terminal NH₂ group.

16. (ORIGINAL) A multifunctional composition for use as an additive for fuels and lubricants comprising an amination product made by the method of claim 9.

17. (ORIGINAL) A lubricant composition comprising an oil of lubricating viscosity and from about 0.1 to 10 wt.%, based on the total weight of the lubricant composition, of the multifunctional composition of claim 16.

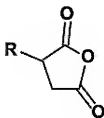
18. (ORIGINAL) A fuel composition comprising a hydrocarbyl fuel and from about 0.1 to about 15.0 weight percent based on the total weight of the fuel composition, of the multifunctional composition of claim 16.

19. (ORIGINAL) A lubricant additive comprising an amination product of a

hydrocarbyl substituted succinic acylating agent and a mixture comprising at least one aliphatic polyamine and at least one aromatic polyamine, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10, and wherein the amination product contains at least about 0.1 molar equivalent of the aromatic polyamine to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

20. (ORIGINAL) The lubricant additive of claim 19, wherein the aliphatic polyamine comprises a substantially linear aliphatic amine.

21. (ORIGINAL) The lubricant additive of claim 19, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:

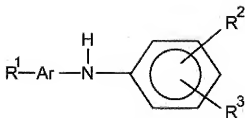


wherein R comprises a hydrocarbyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

22. (ORIGINAL) The lubricant additive of claim 21, wherein R comprises polyisobutylene (PIB).

23. (ORIGINAL) The lubricant additive of claim 19, wherein a molar ratio of acylating agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

24. (PREVIOUSLY SUBMITTED) The lubricant additive of claim 19, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:



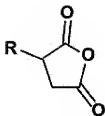
wherein Ar is an aromatic group, R¹ is selected from the group consisting of —NH₂, —NH-aryl-NH₂, —NH-aryl-alkyl-NH₂, —NH-alkyl-NH₂ or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R² is selected from the group consisting of —NH₂, —NH(CH₂)_nmNH₂, —CH₂-(CH₂)_n-NH₂, and —aryl-NH₂, in which n and m have a value of from 1 to 10, and R³ is selected from the group consisting of —H, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R² and R³ has a terminal NH₂ group.

25. (ORIGINAL) A lubricant composition comprising an oil of lubricating viscosity and from about 0.1 to 10 wt.%, based on the total weight of the lubricant composition, of the lubricant additive of claim 19.

26. (ORIGINAL) A fuel additive comprising an amination product of a hydrocarbyl substituted succinic acylating agent and a mixture containing an aliphatic polyamine and an aromatic polyamine, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10 and wherein the amination product contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

27. (ORIGINAL) The fuel additive of claim 26, wherein the aliphatic polyamine comprises a substantially linear aliphatic amine.

28. (ORIGINAL) The fuel additive of claim 26, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:

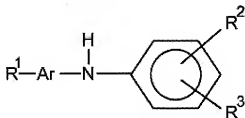


wherein R comprises a hydrocarbonyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

29. (ORIGINAL) The fuel additive of claim 28, wherein R comprises polyisobutylene (PIB).

30. (ORIGINAL) The fuel additive of claim 26, wherein a molar ratio of acylating agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

31. (PREVIOUSLY SUBMITTED) The fuel additive of claim 26, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:



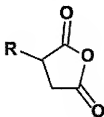
wherein Ar is an aromatic group, R^1 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH-aryl-NH}_2$, $-\text{NH-aryl-alkyl-NH}_2$, $-\text{NH-alkyl-NH}_2$, or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R^2 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH}(\text{CH}_2)_n\text{NH}_2$, $-\text{CH}_2-(\text{CH}_2)_n\text{NH}_2$, and $-\text{aryl-NH}_2$, in which n and m have a value of from 1 to 10, and R^3 is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R^2 and R^3 has a terminal NH_2 group.

32. (ORIGINAL) A fuel composition comprising a fuel and from about 0.1 to 15 wt. %, based on the total weight of the fuel composition, of the fuel additive of claim 26.

33. (ORIGINAL) A method of lubricating moving parts of a vehicle, the method comprising using as a lubricating oil for one or more moving parts of the vehicle a lubricant composition containing a lubricant and a lubricant additive, the lubricant additive including an amination product of a hydrocarbyl substituted succinic acylating agent and a mixture containing an aliphatic polyamine and an aromatic polyamine, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10, and wherein the amination product contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

34. (ORIGINAL) The method of claim 33, wherein the aliphatic polyamine comprises a substantially linear aliphatic amine.

35. (ORIGINAL) The method of claim 33, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:

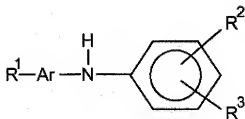


wherein R comprises a hydrocarbyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

36. (ORIGINAL) The method of claim 35, wherein R comprises polyisobutylene (PIB).

37. (ORIGINAL) The method of claim 33, wherein a molar ratio of acylating agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

38. (PREVIOUSLY SUBMITTED) The method of claim 33, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:



wherein Ar is an aromatic group, R^1 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH-aryl-NH}_2$, $-\text{NH-aryl-alkyl-NH}_2$, $-\text{NH-alkyl-NH}_2$, or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R^2 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH}(\text{CH}_2)_n\text{NH}_2$, $-\text{CH}_2(\text{CH}_2)_n\text{NH}_2$, and $-\text{aryl-NH}_2$, in which n and m have a value of from 1 to 10, and R^3 is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R^2 and R^3 has a terminal NH_2 group.

39. (ORIGINAL) The method of claim 33 wherein the vehicle includes an internal combustion engine having a crankcase and wherein the lubricant composition comprises a crankcase oil present in the crankcase of the vehicle.

40. (ORIGINAL) The method of claim 33 wherein the lubricant composition comprises a drive train lubricant present in an automotive drive train of the vehicle.

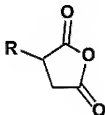
41. (ORIGINAL) A method for lubricating moving parts comprising contacting the moving parts with a lubricant composition containing a lubricant and a lubricant additive, the lubricant additive comprising an amination product of a hydrocarbyl substituted succinic acylating agent and a mixture containing an aliphatic polyamine and an aromatic polyamine, wherein the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10, and wherein the amination product contains at least about 0.1 molar equivalent of the

polyamine mixture to 1 molar equivalent of the hydrocarbyl substituted succinic acylating agent.

42. (ORIGINAL) The method of claim 41 wherein the lubricant composition comprises a gear lubricant present in a gear box.

43. (ORIGINAL) The method of claim 41, wherein the aliphatic polyamine comprises a substantially linear aliphatic amine.

44. (ORIGINAL) The method of claim 41, wherein the hydrocarbyl substituted succinic acylating agent comprises a compound of the structure:

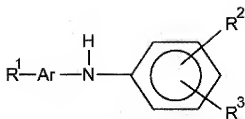


wherein R comprises a hydrocarbyl group having a number average molecular weight as determined by gel permeation chromatography ranging from about 200 to about 10,000.

45. (ORIGINAL) The method of claim 44, wherein R comprises polyisobutylene (PIB).

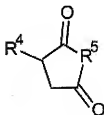
46. (ORIGINAL) The method of claim 41, wherein a molar ratio of acylating agent to amino groups in the mixture ranges from about 1:1 to about 6:1.

47. (PREVIOUSLY SUBMITTED) The method of claim 41, wherein the aromatic polyamine comprises a compound selected from the group consisting of N-phenyl-phenylenediamine, N-naphthyl-phenylene diamine, and substituted aromatic polyamines of the structure:

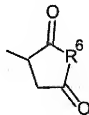


wherein Ar is an aromatic group, R^1 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH-aryl-NH}_2$, $-\text{NH-aryl-alkyl-NH}_2$, $-\text{NH-alkyl-NH}_2$ or aminoalkyl wherein alkyl is a branched or straight chain radical having 4 to 24 carbon atoms, and R^2 is selected from the group consisting of $-\text{NH}_2$, $-\text{NH}(\text{CH}_2)_n\text{NH}_2$, $-\text{CH}_2-(\text{CH}_2)_n\text{NH}_2$, and $-\text{aryl-NH}_2$, in which n and m have a value of from 1 to 10, and R^3 is selected from the group consisting of $-\text{H}$, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R^2 and R^3 has a terminal NH_2 group.

48. (ORIGINAL) An oil-soluble composition comprising a compound of the formula:

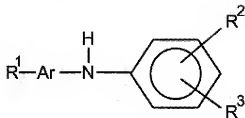


wherein R^4 is selected from the group consisting of linear and branched polyolefins and substituted olefins wherein the olefin-substituent has the structure:

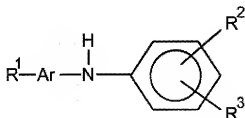


wherein R^6 is selected from one or more linear or branched aliphatic polyamines, aromatic polyamino group derived from N-phenyl-1,4-phenylenediamine, N-phenyl-1,3-phenylenediamine, and N-phenyl-1,2-phenylenediamine, and mixtures thereof

and substituted aromatic polyamines of the structure:

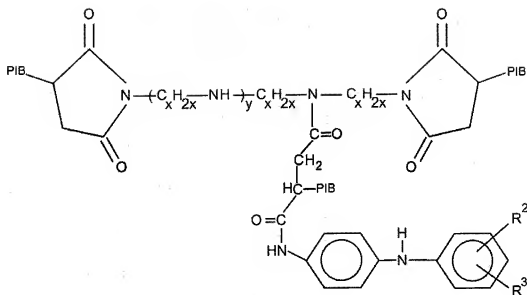


wherein R^1 , R^2 , and R^3 are defined above, and R^5 is selected from linear or branched aliphatic polyamines, aromatic polyamino group derived from N-phenyl-1,4-phenylenediamine, N-phenyl-1,3-phenylenediamine, and N-phenyl-1,2-phenylenediamine, and mixtures thereof and substituted aromatic polyamines of the structure:

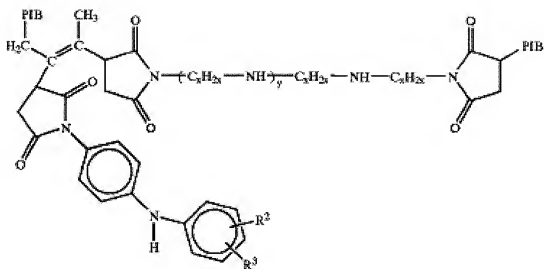


wherein R^1 , R^2 , and R^3 are defined above, and substituted linear or branched aliphatic polyamines, wherein the substituent is selected from H, a hydrocarbyl-substituted succinic anhydride group, an amido acid group, and a diamido group.

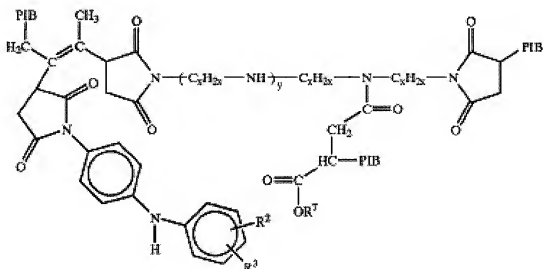
49. (PREVIOUSLY SUBMITTED) An oil-soluble composition comprising a compound selected from the group consisting of bis-succinimide-di-amide-amines of the structure:



wherein PIB is polyisobutylene, x is an integer from 1 to 6, y is an integer from 1 to 10, R^2 is selected from the group consisting of $-NH_2$, $-NH(CH_2)_nNH_2$, $-CH_2-(CH_2CH_2)_n-NH_2$, and $-aryl-NH_2$, in which n and m have a value of from 1 to 10, and R^3 is selected from the group consisting of $-H$, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms and with the proviso that only one of R^2 and R^3 has a terminal NH_2 group; bis-succinimides containing an imide-amine substituted olefin of the structure:

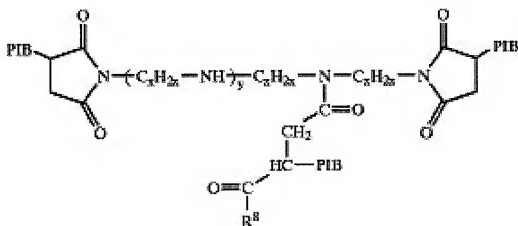


wherein PIB, x, y, R², and R³ are as defined above and bis-succinimide-amides containing an imide-amine substituted olefin of the structure:



wherein PIB, x, y, R², and R³ are as defined above, and R⁷ is selected from the group consisting of H, amine salt, and a metal salt.

50. (PREVIOUSLY SUBMITTED) An oil-soluble composition comprising a bis-succinimide-amide containing an intramolecular-cyclized or intermolecular cross-linked amide-amine containing a structure represented by:



wherein R⁸ is bonded to a secondary nitrogen atom in a polyamine of a bis-succinimide.

51. (ORIGINAL) A lubricant additive containing the composition of claim 49.

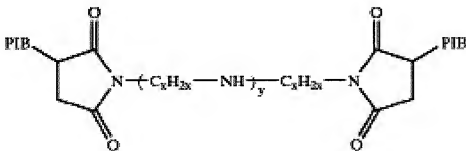
52. (ORIGINAL) A lubricant containing the lubricant additive of claim 50.

53. (ORIGINAL) A fuel additive containing the composition of claim 49.

54. (ORIGINAL) A fuel containing the fuel additive of claim 52.

55-57. (CANCELED)

58. (CURRENTLY AMENDED) A multi-functional composition for use as an additive for fuels and lubricants comprising a reaction product of a polyamine mixture and a hydrocarbyl substituted succinic acylating agent, said reaction product comprising a bis-succinimide of the structure:



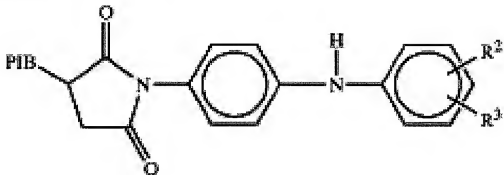
wherein x is an integer ranging from 1 to 6, and y is an integer ranging from 1 to 10, and PIB is a linear or branched polyisobutylene group; and wherein the polyamine mixture contains aliphatic and aromatic polyamines each having one or more amino groups and the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10; and wherein the composition contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the bis-succinimide.

59. (PREVIOUSLY SUBMITTED) The composition of claim 58, wherein the aliphatic polyamine comprises a substantially linear aliphatic polyamine.

60. (CANCELED)

61. (PREVIOUSLY SUBMITTED) A multi-functional composition for use as an additive for fuels and lubricants comprising a reaction product of a polyamine mixture and a hydrocarbyl substituted succinic acylating agent, said reaction product

comprising a compound of the structure:



wherein R² is selected from the group consisting of -NH₂, -NH(CH₂)_nNH₂, -CH₂-(CH₂CH₂)_n-NH₂, and -aryl-NH₂, in which *n* and *m* have a value of from 1 to 10, and R³ is selected from the group consisting of -H, alkyl, alkenyl, alkoxy, arylalkyl, and alkaryl having 4 to 24 carbon atoms; and wherein the polyamine mixture contains aliphatic and aromatic polyamines each having one or more amino groups and the molar ratio of aliphatic polyamine to aromatic polyamine in the mixture ranges from about 10:0.1 to about 0.1:10; and wherein the composition contains at least about 0.1 molar equivalent of the polyamine mixture to 1 molar equivalent of the compound.

62. (PREVIOUSLY SUBMITTED) The composition of claim 61, wherein the aliphatic polyamine comprises a substantially linear aliphatic polyamine.

63. (CANCELED)

64. (NEW) The composition of claim 1, wherein said mixture is obtained by mixing at least one aliphatic polyamine and at least one aromatic polyamine.